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TECHNICAL MEMORANDUM

Date: December 11, 2013
To: Kira Swanson, Island County Project Manager
From: Jennifer Thomas, Senior Scientist, Parametrix
Subject: Technical Memorandum Documenting the Rationale for use of models, maps and data sets as part of Island County's FWHCA Ordinance Update
Project Number: 553-6434-001 (01/03)
Project Name: Island County

WATERSHED CHARACTERIZATION MODEL

As part of its regulatory update, and in compliance with the Grown Management Act requirement to use the Best Available Science, Island County is choosing to consider landscape-scale ecological processes as the first step in understanding existing conditions with respect to Fish and Wildlife Habitat Conservation Areas (WAC 365-190-130). Island County's intent is to consider these ecological processes as expressed in a set of assessments known as the Puget Sound Watershed Characterization jointly developed by Ecology, and WDFW, with support from the USEPA.

The Puget Sound Watershed Characterization I is a coarse-scale decision support tool that can be used to inform watershed-based planning at the regional and local government level. The model, spatially organized around watersheds that are tributary to the Puget Sound, is comprised of several assessments, grouped by water flow, water quality, (collectively known as the water resources, and discussed in Volume 1¹, and terrestrial, freshwater and marine habitats (collectively known as the habitat assessments, and discussed in Volume 2²). Each assessment of the watershed characterization aggregates relevant data sets available in GIS format, and compares the relative value of various portions of the landscape for their importance to the ecological process under consideration for providing water flow, water quality, and habitat function. The characterization further identifies areas on the landscape that are most suitable for restoration, conservation, protection, or those areas which maybe best suited for additional development because they lack intact water or habitat resources.³

The intent of watershed characterization is to analyze ecological conditions from a landscape scale perspective. By understanding the relative condition of ecological processes on a landscape, local governments can ensure the restoration and protection actions are targeted where they will have the most value.

1 Ecology Publication #11-06-016, Puget Sound Characterization, Volume 1: The Water Resource Assessments, Water Flow and Water Quality, Stanley et al, 2012.

2 The Puget Sound Watershed Characterization Project, Volume 2. A Coarse Scale Assessment of the Relative Value of Small Drainage Areas and Marine Shorelines for the Conservation of Fish and Wildlife Habitats in Puget Sound Basin, February, 2013, Wilhere et al.

3 The model ties these terms ('restoration', 'protection', 'conservation', 'development'), to model output results. See Volume 1 discussion of Watershed Management Matrix for more information on model output and how to interpret model results.

In the context of Fish and Wildlife Habitat Conservation Areas, the results of Watershed Characterization's assessment outputs was thought to provide insight into the ecological processes that affect habitats and species of local importance; ecological process leads to structure, which provides habitat function. In a river, for example, the processes of water and sediment movement produce sediment bars and channel features (structure), which in turn provide off-channel rearing habitat for salmonids (function). To maintain or restore the structure and function of the Puget Sound ecosystem, important watershed processes that are still intact need to be identified and protected, and those that have been severely degraded need to be restored.

By understanding the relative importance and condition of ecological processes, based on consideration of Puget Sound Watershed Characterization results, Island County would be in the position to look beyond individual species, to ensure that the underlying ecological process that sustained the habitat and species would be identified and considered for protection as part of the regulatory update process. The intent of the model is to engage in a holistic analysis of the ecosystem to ensure that habitats and species are sustainable in the long-term, thus complying with the Growth Management Act's rule related to regulatory updates (WAC 365-190-130), as well as the Growth Management Hearing's Board compliance order.

Watershed Characterization Volume 1 - Water Flow

Island County convened a technical advisory group (TAG), composed of local experts regarding habitat conditions on Island County, as an advisory group to its regulatory update process. Two meetings were held with the TAG to explain how Watershed Characterization works, and how to interpret model results. Forty-eight maps were prepared for analysis, showing importance and degradation for all subcomponents of Water Flow, (Volume 1 Watershed Characterization) as well as the Habitat Assessment Models (Volume 2).

The Watershed Characterization Water Flow model breaks the landscape into three landscape groups, Mountainous, Lowland, and Coastal Units. The Mountainous landscape group does not occur within Island County.

At an initial meeting with the Island County Technical Advisory Group (TAG), a recommendation was made to combine Lowland and Coastal Landscape groups into one landscape group. The model compares Assessment Units within Landscape group, so this decision had the effect of creating one landscape group within Island County such that all model results are compared within that landscape group.

Ecology made this change to the model, and further recommended that the County focus its analysis primarily on the storage and discharge sub models of water flow, since these submodels are related to the presence and condition of depressional and slope wetlands, which are known to be essential for maintaining stream flows, and in turn, fish habitats. .

Both the surface storage and discharge submodels use the presence of these wetlands for scoring, but can also be used to indicate where the most important upland areas for conserving aquatic habitats may be located in Island County.

For scoring the level of degradation to wetlands, the storage submodel evaluates the intensity of development adjacent and upland of wetlands. The discharge submodel also looks at road density (roads intercept shallow groundwater flow) within the contributing watershed of a wetland. Both of these degradation factors for water flow also impact the movement of wildlife in and out of wetlands. Therefore the results of the storage and discharge submodels could be used to evaluate the general effect of watershed development on the habitat function of wetlands, which, in turn, may be correlated to higher productivity and species richness.

By starting with the AUs scored for "protection" Island County could add results from both the characterization terrestrial habitats model and additional finer scale information in order to support final decisions on qualifying Fish and Wildlife Conservation areas. While this analysis was considered for use in the FWHCA ordinance update, it was determined, in consultation with Island County and Department of Ecology staff, that wetlands are

a critical area already protected under Island County's ordinance, and that identifying specific, high quality wetlands as correlated to higher species productivity would be too indirect of an approach for this regulatory update process. After discussion, it was decided not to pursue further analysis of the Water Flow submodels for discharge and storage.

With respect to Water Quality, it was determined the Island County Water Quality database, and the data on recharge provided by Doug Kelly, (Island County staff hydrogeologist, provided a finer scale of resolution than that provided by either the recharge subcomponent model Water Quality model of Watershed Characterization. Therefore, Ecology recommended using Island County's local data sets as most appropriate for analysis instead of the Watershed Characterization subcomponent models for Water Quality and recharge. It should be noted that recharge is a process critical to aquifers that is beyond the scope of this regulatory update. Aquifer recharge analysis should form the basis of the critical areas ordinance related to that subject area, and is beyond the scope of this Fish and Wildlife Habitat Conservation Areas ordinance update.

Watershed Characterization Volume 2 – The Habitat Assessment Models

Volume 2 of the Watershed Characterization includes habitat assessment models for terrestrial habitat, freshwater habitat, and marine shoreline habitat. Results from the terrestrial habitat assessment model were presented at a TAG meeting in October of 2013. Based on the map results, the TAG had concerns regarding the accuracy of some model output. WDFW staff analyzed the results and determined that one of the underlying data sets, the Washington State Parcel Database (RTI 2011) used land use codes which may have been inaccurate. For example, the database identified parcels within Deception Pass State Park as residential, while in fact these forested parcels are not under threat of development.

An effort was made to determine how to resolve this problem. Unfortunately, each tax parcel in the database would have to be analyzed for accuracy, which would involve analyzing thousands of parcels. This would be a significant increase in the level of effort anticipated as part of the project, and could not be undertaken given the project schedule mandated by the GMHB Compliance Order.

Because Island County was interested in understanding the relative value of its habitats, and use of those habitats by species, as determined by a model, WDFW staff spent considerable time and effort working with Island County and the project team to develop alternative approaches to using the Watershed Characterization Volume 2 models, or failing that, alternative maps above and beyond existing data sets, that could provide Island County with a path forward.

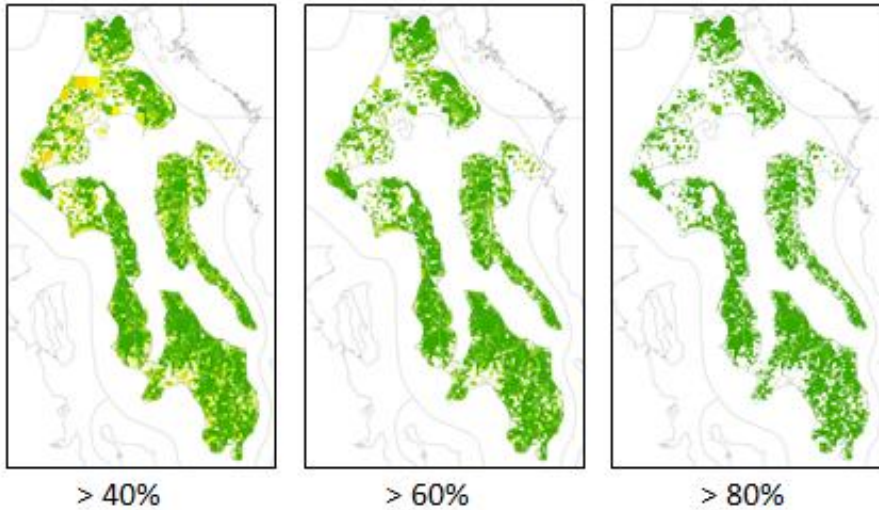
On December 10, 2013, WDFW provided the results of an analysis that characterizes existing forest habitat conditions in Island County.

Terrestrial Habitat Assessment Maps

With respect to the use of the Terrestrial Habitat map results from the Watershed Characterization model, WDFW offered the following map set:

terrestrial habitats/open space

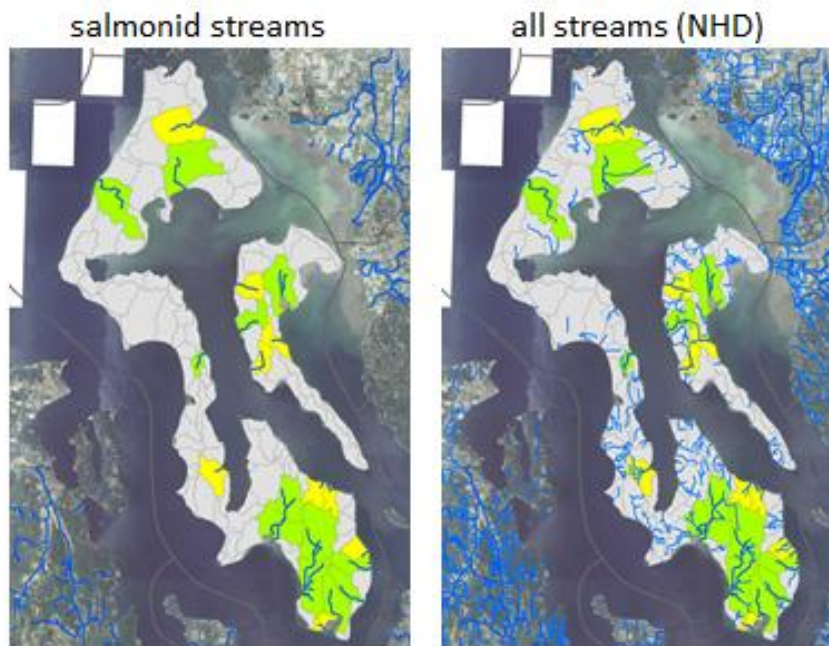
percent forest & shrub per parcel



The maps show the percent cover (in forest and shrub cover) on Island County in increments of percent cover, using parcel data, and land cover data developed by WDFW as the basis for analysis. The dark green indicates areas of high forest/shrub cover, while the yellow to red indicates areas of low forest/shrub cover. These maps show the areas within Island County that contain increasingly higher percentages of forest/shrub cover. Forest and shrub cover are indicators of habitat connectivity, and are important structural elements in existing habitat for terrestrial species. Should Island County wish to consider regulating habitat corridors or land cover, based on existing forest conditions, these maps could form the basis of those regulatory considerations. They could also provide a basis for non-regulatory incentives, such as the County's Public Benefit Rating System (PBRs). For example, where an existing corridor is present, the County may consider tax benefits for extending or enhancing the corridor by planting with native species.

Streams – Salmon-bearing and non-salmon-bearing

WDFW provided the following maps as the basis for analysis of existing conditions of streams, an aquatic resource regulated under Island County's Fish and Wildlife Habitat Conservation Areas ordinance.



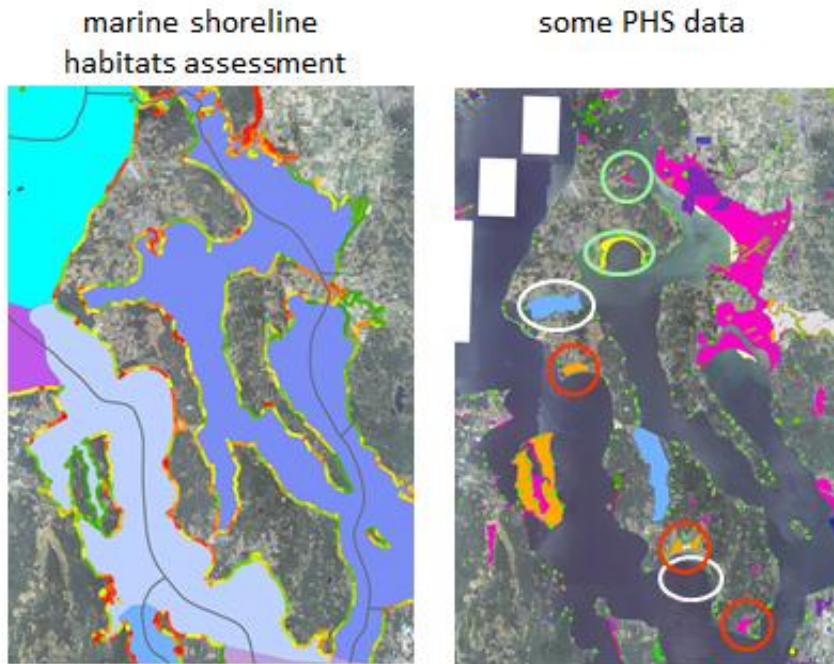
Following discussion with WDFW and Island County staff and the project team, it was determined that these maps could provide the basis for the best available science update of the FWHCA (WAC 365-190-130), and could be further supplemented with the addition of data available from stream surveys conducted by Island County staff⁴, as well as newly published data on the presence of salmonids, and stream sampling locations within Island County as presented by Beamer et al (2013)⁵.

⁴ Janet Kearsley, 1999. Fish Bearing Creeks Identified in Island County.

⁵ Juvenile Chinook Salmon Rearing in Small Non-Natal Streams Draining in to the Whidbey Basin. Beamer et al, 2013,

Species and Habitats of Local Importance

WDFW staff additionally provided the following maps for marine shorelines and PHS data.



WDFW staff explained that the different background layers in the waters surrounding Island County denote varying oceanographic sub-basins. The dark blue is the oceanographic sub-basin surrounding Camano Island and the mainland, the grey is the oceanographic sub-region surrounding the west side of Whidbey Island and the Olympics Peninsula, while the turquoise oceanographic sub-basin comprises the San Juan Island shorelines. The effect of this is that shorelines within each of these sub-basins are compared to each other, so the relative importance (as denoted by the green, yellow, red, meaning high to low value, is as compared to other shoreline segments within that oceanographic sub-basin. Shoreforms and shore zones are broken out by geomorphic structure within each sub-basin (e.g. beach, bluff, cove, the type of bluff, the type of vegetation). The darkest green color indicates shorelines with the highest species richness (according to the available data), while the red indicates the lowest species richness, within each oceanographic sub-basin. There are some known data gaps (for example, juvenile salmonid use of the shoreline was not considered). However, species data for 41 species is considered in the model, and is described in Appendix D of Volume 2 of the Puget Sound Watershed Characterization Habitat Assessment Models.

This map is valuable in the FWHCA process because it can form the basis for understanding the relative importance of marine shorelines within Island County, by oceanographic sub-basin. While these shorelines are protected, by definition, in the County's proposed SMP, five of the nine designated Habitats of Local Importance in the County's current ordinance occur within the marine shoreline. This map provides the County with a transparent, scientifically defensible means of identifying the relative importance of marine shoreline in Island County, and could be used as the basis for identifying future Habitats of Local Importance. This map will inform the County's regulatory update process and will be included in the Best Available Science and Existing Conditions report.

Habitats of Local Importance

The map on the right identifies three of the County's existing designated Habitats of Local Importance that also occur near the marine shoreline (areas circled in red). This map is helpful in that it also identifies additional areas of significant habitat (areas circled in green), such as the shorebird concentration areas on the northeastern side of Whidbey Island, at Dugualla Bay (pink color), as well as the areas within Crescent Harbor on the northeast side of Whidbey Island that have documented winter use by Harlequin Ducks. These areas clearly provide habitat, though they are not currently designated as Habitats of Local Importance by Island County's ordinance. These species occurrence data provide an objective basis for a process by which criteria for designated Habitats of Local Importance, which would presumably include habitat use, could be considered for future designation.

Following a presentation by WDFW staff, during which the map results were explained, the project team determined that use of WDFW's PHS data, as supplemented with data from Todd Zackey regarding salmonid use of streams, information on Island County streams from the 1999 Janet Kearsley study, and Island County Water Quality data could provide a justifiable basis for FWHCA ordinance updates in place of the use of Watershed Characterization results. All data sets used in the ordinance update will be documented in the Best Available Science and Existing Conditions of Island County technical report. At this time that report is anticipated to be completed in January 2014.